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PUBLIC HEALTH REPORTS

VOL. 32 JANUARY 5. 1917 No. 1

REGISTRATION OF BIRTHS AND DEATHS.

THE SUPREME COURT OF ARKANSAS DECIDES THAT LOCAL REGISTRARS ARE STATE OFFICERS AND THAT THEIR COMPENSATION SHOULD NOT BE PAID BY THE COUNTIES.

In 1913 the legislature of the State of Arkansas passed a law providing for the appointment of local registrars of births and deaths by the State registrar of vital statistics and for the payment of local registrars by the counties on certification by the State registrar that prompt reports had been made to him.

The supreme court of Arkansas has decided that under the constitution of the State the counties can not be required to pay the local registrars, as they are considered to be State officers. This feature of the law has therefore been declared unconstitutional.

The opinion is published in this issue of the Public Health Reports, page 22.

THE NEW UNITED STATES LIFE TABLES.[1]

THEIR PURPOSE AND WHAT THEY SHOW.

By JAMES W. GLOVER, Professor of Mathematics and Insurance, University of Michigan, and Special Agent, United States Bureau of the Census.

Speculation on the chances of life and death has been indulged in by writers, artists, and philosophers of all ages. The dominant note characterizing these reflections, particularly in the mediæval arts, is that Death strikes at random; that there is no law in the aiming of his shaft. This belief[2] is borne out in the dances of death which picture the skeleton reaper leading alike the young and old, rich and poor, good man and gambler, in a wild dance to the grave. A fifteenth-century painting of a dance of death is still preserved on the walls of the chapel of the Marienkirche at Lübeck. Holbein in the beginning of the sixteenth century produced 53 designs of the "Danse Macabre," which express the traditions of this period concerning death. They are pronounced by a high authority to be the first and perhaps greatest satirical moralities known to the modern world.

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[1] Read before the Section on Vital Statistics, American Public Health Association, Cincinnati, Ohio, Oct. 27, 1916.

[2] Karl Pearson dwells on this theme in his essay on "The Chances of Death."

Death is pictured in various forms, all more or less hideous and fantastic. A famous fresco in the Campo Santo, Pisa, "The Triumph of Death," dating back to the middle of the fourteenth century, depicts Death as an old hag with batlike wings about to descend upon a company of youths and maidens, who in the enjoyment of music and love, are quite unaware of the grim presence. Throughout this painting, rich in subjects and details, the moral is to prepare for the unexpected coming of death, by a life of meditation and good deeds, rather than to indulge in the selfish pursuit of worldly pleasure.

The same thought runs through the greatest of the morality plays, Everyman, which is assigned to the latter half of the fifteenth century. When "Dethe" appears unexpectedly to Everyman—"O, Dethe, thou comest when I had thee leest in mynde!"—he is deserted by all his friends except "Good Dedes." Everyman, when advised by "Dethe" that he "must take a longe journey," implores in vain for respite:

O wretched caytyfe, wheder shall I flee,
That I myght scape this endles sorowe?
Now, gentyll Dethe, spare me tyll to-morowe,
That I may amende me
With good advysement!

Dethe:

Naye, therto I wyll not consent,
Nor no man wyll I respyte;
But to the herte sodeynly I shall smyte
Without ony advysement.

In more recent times music has contributed through Kastner a remarkable treatise on "Les Danses des Morts" and Saint Saëns gave to the world the beautiful and mournful symphonic poem, the Danse Macabre.

The English bills of mortality, which correspond to our death certificates, first appeared about 1538, but the age at death was not stated in these bills until as late as 1728. This would indicate that little importance was attached to the age at death and may be regarded as consistent with the notion that death was a random distribution with respect to age as well as social condition.

The idea of blind chance in the hand of Death probably persisted in the minds of the masses throughout the last century. This is reflected in the almost universal practice of guilds and societies of the working classes of collecting equal dues of all, without regard to age, for insurance protection or funeral benefit in the event of death.

It was not until the end of the seventeenth century that Edmund Halley, the distinguished English astronomer and mathematician, prepared the first life table and showed that the law of averages, not pure chance, governed the steps in the weird dance of death. This result was presented to the Royal Society in the form of a paper entitled "The degrees of mortality in mankind," and published in the Philosophical Transactions in 1693. This table has since been known as the Breslau table. No English records being available at that time, it was based on the records of 6,193 births and 5,869 deaths in the city of Breslau in Silesia during the five years 1687 to 1691.

I have often wondered if Addison's Vision of Mirza, which appeared in the Spectator in 1711, 18 years later, was not inspired by Halley's Breslau life table. This remarkable allegory presents a most striking picture of the march of human life, of the Dance of Death. Mirza, the prince, is led by the genius to the highest pinnacle of a rock near Bagdad, where the following colloquy takes place:

> "Examine now," said he, "this sea that is thus bounded with darkness at both ends and tell me what thou discoverest in it."
>
> "I see a bridge," said I, "standing in the midst of the tide."
>
> "The bridge thou seest," said he, "is human life; consider it attentively."
>
> Upon a more leisurely survey of it I found that it consisted of three score and ten entire arches, with several broken arches, which added to those that were entire made up the number about an hundred. As I was counting the arches the genius told me that this bridge consisted at first of a thousand arches, but that a great flood swept away the rest and left the bridge in the ruinous condition I now beheld it.
>
> "But tell me further," said he, "what thou discoverest on it."
>
> "I see multitudes of people passing over it," said I, "and a black cloud hanging on each end of it."
>
> As I looked more attentively I saw several of the passengers dropping through the bridge into the great tide that flowed underneath it, and upon further examination perceived there were innumerable[1] trapdoors that lay concealed in the bridge which the passengers no sooner trod upon but they fell through them into the tide and immediately disappeared. These hidden pitfalls were set very thick at the entrance of the bridge, so that throngs of people no sooner broke through the cloud but many of them fell into them. They grew thinner towards the middle, but multiplied and lay closer together towards the end of the arches that were entire.
>
> There were, indeed, some persons, but their number was very small, that continued a kind of hobbling march on the broken arches, but fell through one after another, being quite tired and spent with so long a walk.

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[1] Pearson in "The Chances of Death" pictures the bridge of life, and in place of the concealed trapdoor introduces five skeleton marksmen who shoot down the passengers, in accordance with the distribution in five frequency curves whose resultant he conceives to represent approximately the law of human mortality.

In the Vision of Mirza the delightful contributor to the Spectator has given us the first and most entertaining description of a life table. It is free from technicalities and unblemished by the presence of a single statistical fact. To convert it into a modern life table and make the transition as easy as possible, I will merely add that in this bridge of human life each span or arch represents a year, and the throng or multitude entering upon the bridge is usually taken as 100,000. The life table then shows in cold figures the number of passengers who fall through the concealed trapdoors in each span or age interval, in other words, the number of survivors at each age out of 100,000 persons born alive. Upon this fundamental information is built up the entire structure of the modern life table.

This year (1916) the Bureau of the Census issued the first publication devoted exclusively to life tables; it appears under the title[1] "United States Life Tables: 1910," and contains 25 life tables prepared under the supervision of Prof. James W. Glover, of the University of Michigan. Similar tables have been published from time to time in England, France, Germany, Sweden, and other countries; in some cases these tables date back over a century, and tables based on statistics collected during the period 1850 to 1900 are quite numerous.

The new United States life tables are based on the census enumeration of 1910 and the mortality statistics of 1909, 1910, and 1911, in the original registration States, consisting of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Indiana, and Michigan, and the District of Columbia.

The first table is for both sexes in the original registration States; it is fairly representative of mortality conditions prevailing in this country because it is based on over 24,000,000 enumerated lives and 1,000,000 reported deaths. The next 14 tables are for males and females, respectively, in the following classes in the original registration States: Aggregate, white, Negro, native white, foreign white, cities, and rural. Finally, 10 tables appear for male and female, respectively, in Indiana, Massachusetts, Michigan, New Jersey, and New York.

The preparation of a life table from the census and mortality statistics is like striking a balance in a set of accounts. Only through the life table can one know at each age the mortality rate, expectation of life, and annual death rate in the community. Crude rates may be quite misleading; for example, a pioneer community including an excess of young persons might show a lower annual death rate than another community in which there is a preponderance of older people, and it might be inferred that the first group was enjoying a more favorable mortality rate. A life table based on the same data might show that in the first community the mortality rate was actually higher at every age than in the second.

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[1] A copy may be obtained free by writing to the Director of the Census, Washington, D. C.

The United States life tables are intended chiefly as a source of information for the public, and to this end are presented in simple form with detailed explanations and numerous examples illustrating their use. Apart from this general purpose they are expected to serve as a source of reference to public health officials, students of vital statistics, and physicians. Statisticians, actuaries, sociologists, economists, and writers on public health will find much useful material for consideration, discussion, and interpretation.

Life tables are frequently used in legal practice in cases where the value of a life annuity is needed to fix the measure of damages; the value of the expectation of life is also required very often. They may also be employed in the valuation of reversions, retirement funds, and old-age pensions. The tables which have heretofore been employed have too often been based on statistics not applicable in this country. It is well known that the Northampton table based on English experience exhibits mortality rates altogether too high and annuity values correspondingly too low. Other tables employed have been based upon insurance experience involving selected lives. The present tables will in most legal cases be found better adapted to conditions in this country.

A detailed comparative study of mortality in different classes of the population is made possible through the life tables and raises numerous important questions which deserve the most careful consideration. Among the larger questions a few may be mentioned here. The excess of city over rural mortality is so great that the attention of health officials should be given to this subject without delay to determine its cause and to what extent it is practicable to reduce city mortality to the minimum actually existing in the country. To give an idea of the difference, the tables show that out of 100,000 rural male births 58,117 survive to age 60, while among the same number of city births only 43,454 survive to this age. In other words, 14,663 more men out of the same number of births—100,000—would attain to age 60 in the country than in the city on the basis of existing mortality rates. These figures are so astounding that they deserve the utmost prominence. Similar differences exist in England and Germany, as shown by recent life tables. The tables show that the mortality rates among women are lower throughout the entire range of life than for men and that the expectation of life of women is much greater. While this is true in general, there is a striking exception in the case of rural women. It appears from the tables that from ages 20 to 40 the mortality rate for rural women is almost as great as that of the men, except from ages 25 to 31, where it is actually greater. The same thing occurs in the case of negro women from ages 10 to 20. It would be interesting to know what is the cause of these curious exceptions.

There is considerable interest at the present time in occupational mortality, particularly in the manufacturing industries. The life table for Massachusetts exhibits approximately occupational or industrial mortality as compared with that exhibited by a State like Indiana, which is largely rural. The industrial mortality is greatly in excess of that in the rural communities.

The infant mortality tables contained in the United States Life Tables offer an excellent opportunity for a comparative study of infant mortality in different classes of the population.

In all these studies the question naturally arises whether the differences exhibited in mortality rates are due to racial characteristics and not easily changed, or whether they are due to environment and mode of living and admit of improvement.

Is it possible to attain approximately as favorable a mortality for all classes as the actual minimum now existing for rural men and women? The answer to this question is of profound significance to the people of this country.